believes that it will be possible to transmit speech electrically, because it might have been asked why I had classed among so many remarkable inventions an idea that, presented by the author as it is, is not more than a dream. However, to be faithful to the *rôle* that I have imposed upon myself of speaking of all the applications of electricity that have become known to me, I wish to quote here the information which the author has published on this subject.

"After the marvellous telegraphs which are able to reproduce at a distance writing of this or that individual, and designs more or less complicated, it seemed impossible, said M. B——, to advance further in the regions of the marvellous. Nevertheless, essaying to do something more, I asked, for example, if speech itself would not be capable of transmission by electricity; in a word, if one would not be able to speak at Vienna and be heard at Paris. The thing is practicable. This is how: Sounds, it is known, are formed by vibrations and carried to the ear by these same vibrations, which are reproduced by the intermediate media.

"But the intensity of these vibrations diminishes very rapidly with the distance, from which it follows, even in the employment of speaking trumpets, tubes, and of acoustical horns, the limits which cannot be surpassed are very restricted. *Imagine that one speaks near a mobile plate, flexible enough not to lose any of the vibrations produced by the voice, that this plate establishes and interrupts successively the communication with a battery. You would be able to have at a distance another plate which would execute at the same time the same vibrations.*

"*It is true that the intensity of the sounds produced would be variable at the point of departure where the plate is vibrated by the voice, and constant at the point of arrival where it is vibrated by electricity.* But it is demonstrable that this would not alter the sounds.

"It is evident from the first that the sounds would reproduce themselves with the same pitch in the scale. The actual condition of acoustical science does not permit of saying, *à priori*, whether the same conditions would hold good for all syllables articulated by the human voice. The manner in which these syllables are produced is not yet sufficiently well known.

. . . . . .

"In any case it is impossible to demonstrate, in the present state of science, that the electric transmission of sounds is impossible. Every probability, on the contrary, is for the possibility. An electric battery, two vibrating plates, and a metallic wire will suffice.

. . . . . .

"It is certain that, at a time more or less distant, speech will be transmitted to a distance by electricity. I have commenced some experiments to that effect, they are delicate and require time and patience. But the approximations obtained point towards a favourable result." PAGET HIGGS

Museums

THE following suggestions may possibly prove useful to directors of museums, and especially of provincial museums. Most of the plans recommended have been tried with success.

It is very desirable that in all collections intended for public instruction manuscript labels should be abolished. The advantages of perfect legibility, uniform style, and an occasional change of cards far outweigh the cost of letter-press. A convenient hand-press costs about 3*l.*; several founts of type in quantity sufficient for museum purposes, may be had for 5*l.* An assistant can be taught printing in a few days; I have at times engaged a printer's apprentice, paying sevenpence an hour for his services.

The proper display of dissected preparations put up in spirit has long been a serious trouble. Most dissections of small size can be pinned out on wax. Young's Paraffin Light and Mineral Oil Company, of West Calder, have lately prepared, at my request, smooth paraffin slabs, coloured deep blue, and cut to 12 in. × 6 in. These can be had at a shilling a pound. Cylindrical glass vessels are objectionable, not only on account of distortion, but because they render it difficult to demonstrate details of structure. Rectangular trays with movable plate-glass lids are far more convenient. These may be made of ebonite for the smaller sizes, and of wood lined with gutta-percha where the cost of ebonite becomes important. I hope before long to get a useful tray cast in glass. The edges must be accurately ground, and the cover secured by light brass clamps. In the bottom of the tray the wax tablet can be securely fixed. It is useless to cement the lid to the tray. Hardly any cement will stand prolonged exposure to dilute spirit, and it is necessary to readjust or clear the dissection from time to time.

Fossils are usually kept loose; in the larger collections they are mounted on tablets of wood or glass covered with paper. The first method is untidy and often causes loss of labels; wooden tablets are costly, difficult to cut of quite uniform size, and liable to warp; glass is also difficult to cut true, and wastes much time in covering with paper. Ten years ago I procured a supply of pasteboard tablets one-tenth of an inch thick from a pattern-card maker and have used them exclusively since. They are cheap (ninepence to a shilling a pound), can be cut perfectly true by machinery, do not warp, and may be had of any colour. Fossils glued to pasteboard with coaguline are perfectly fast; we range them in wall-cases upon shelves sloped to forty-five degrees, and never meet with accidents.

In our geological wall-cases I have introduced above the level of the eye a range of boards, nearly upright, but sloping slightly forwards at the top, upon which maps, sections, photographs, and descriptive notices can be pinned. In a palæontological collection this space is useful for drawings of restored animals.

It is much to be desired that the dealers would procure a better choice of zoological models in glass and porcelain. Reuss' foraminifera are still useful, though antiquated; Blaschka, of Dresden, keeps no stock, though he has supplied many of our museums with useful models in glass made from drawings. We want artistic and accurate coloured models of mollusca, hydrozoa, &c., far beyond the present supply.

Stuffed animals, especially stuffed mammalia, are the plague of a curator. I do not refer especially to their liability to moths (insects of all kinds can be kept down by placing saucers of carbolic acid in the cases) but to their grotesque deformity, their unnatural attitudes, and their proneness to contract in unexpected places. A model in plaster or clay, strengthened internally by wires would last for ever, and the skin would stretch over it readily enough when moist. Real skill in modelling is required here, and we have not yet been able to command it. The Schools of Art may in time help us over the difficulty. A well-modelled animal can never be very cheap, but if increased costliness should render set-up quadrupeds comparatively scarce, zoology need not suffer on that account.

Public museums should contain far more than they now do the elementary explanations necessary for the right understanding of the objects exhibited. A text-book illustrated by specimens instead of wood-cuts should be our aim, at least where the wants of the public are more concerned than the wants of special students. I should propose to relegate nine-tenths of our existing collections to cabinets were it not that things out of sight in cabinets are so liable to suffer from neglect. At present we aim at too much, introduce too many departments into a small museum, show too many obscure and uninstructive objects, and spoil everything by over-crowding.

Personally, I do not hold that local collections should be everything in a provincial museum. We have to consider the wants of residents as well as of passing strangers, and what the residents interested in natural history require is a general collection of typical specimens which will teach them something of the elements of their science. It is very easy to make imposing collections of land and fresh-water shells, butterflies, and so forth, which a naturalist passing that way praises because they contain here and there a choice thing, but which either teaches nothing to the uneducated visitor, or else teaches him the very undesirable lesson that the best thing he can do is to make a similar collection for himself. We have had more than enough of unintelligent collecting and unintelligent records of occurrence. Our provincial museums should tell the public that to know something of the structure of animals and plants is better than to know many species. L. C. MIALL

Leeds, August 17

THE great difficulty, as it seems to me, in promoting and maintaining the efficiency of our local museums lies in providing them with suitable curators; and in this connection an idea which occurred to me last year may prove not unserviceable. I have seen a large number of our provincial museums, and in many of them have found really extensive and valuable collections of natural objects which only require to be rightly named

and properly arranged to become admirable educational aids. In few, however, is there enough material to engage the whole time and attention of an able man in taking care of it; indeed a single month devoted to each of the departments of zoology, botany, geology, and so forth, would suffice, and, in many cases, more than suffice, to put each into working order to begin with, and after the first arrangement it would be easy enough to maintain the efficiency of each collection and to add what fresh acquisitions might be made in the course of a week's visit once a year.

Let, then, an association of the younger workers in the various branches of science be formed in London, under the direction of a committee of well-known names, and let it offer to send out every year for short intervals, to such museums as should be ready to pay for them, botanists, zoologists, geologists, and the rest, to name and arrange their several collections; each member so dispatched would then visit several museums in succession, confining his attention in each to the collection made in his own subject, and each museum would be visited by several members, one member for each of its essentially different collections. Thus for a slight expense (payment on the piece-work system) a large number of our Local Museums would be put under the curatorship of a group of specialists, and so be brought into efficient and permanent working order. The idea is simply that of visiting curatorships supplied on the principle of co-operation, and made possible by the facilities for travelling afforded by our modern railway system.

It can scarcely be doubted that in the summer, when lectures and lecturing are over, many scientific men might be found willing and able to undertake the task. W. J. S.

Rainbow Reflected from Water

MR. CROOKES' interesting observation of the reflection of a rainbow—described in his letter in NATURE, August 16—is easily reproduced, on a small scale, experimentally.

I fixed a "spreader" to the nozzle of a garden-engine so as to cause a shower of fine drops of water to spread in the sunshine. The segments of a bright primary rainbow and of a rather subdued secondary one stood out well-defined against the dark foliage of some trees, the remainders of the bows being lost against bright objects and sky behind.

At whatever point the bows were visible, I found that by placing a mirror or blackened glass wetted so as to form a surface of water, in place of the eye, and then observing from a fresh point, the reflections of both bows could be very distinctly seen at the same time that real bows were also visible.

The reflected bows were always apparently smaller in diameter than the real bows which were visible at the same time from the same position. The reason of this is, I presume, that the bows seen in the mirror are not the reflections of the bows visible, at the same time to the eye, but of bows which the eye would see if it occupied the place of the mirror, or rather of that portion of it which is observed. When, for instance, the mirror is one yard below the level of the eye, the drops by which the bows are formed that are reflected by the mirror, are necessarily about one yard below the corresponding drops by which the direct bows seen by the eye are formed; in other words the direct bows are one yard above the bows which are actually reflected. Therefore, when both are cut by a common horizontal line formed by the surface of the mirror, a reflected bow must be the more shortened of the two and its diameter apparently reduced.

I would suggest that this may be the explanation of the displacement of the colours where the real and reflected bows met, which Mr. Crookes observed. ROBERT SABINE

Hampton Wick, August 20

The Greenland Foehn

DANS le dernier numero (406) de votre journal je vois que vous m'avez fait l'honneur de donner un abstract d'un petit travail sur le foehn du Groenland. Malheureusement le rapporteur n'a pas bien compris le danois (ou le norwegien) en quelques endroits, et je me permettrai de vous indiquer les méprises suivantes comme les plus dangereuses.

2ième alinéa.—"Dr. Pfaff has carried on . . . . and these show that the average temperature of *February*, 1872, was — 8°·7 C., and of *February*, 1863 — 31°·6," etc. Les deux mots, "February," sont omis, ce qui fait croire que je parle de la température moyenne de l'année au lieu d'un mois.

5ième alinéa.—"These explanations go a great . . . . when at Jacobshavn shortly before *July*, 9° C. of heat are recorded." Au lieu de "July" j'ai dit "Christmas"; une température de 9° C. est normale en juillet.

Août 21 W. HOFFMEYER

On the Supposed Action of Light on Combustion

IN answer to Mr. Watson's inquiry contained in your last number, I may state that at the meeting of the British Association at Exeter, in 1869, I read a paper under the above title (See *Phil. Mag.* for September, 1869), in which some comparative experiments were made on candles burning in full sunshine and also in a darkened closet. This mode of experiment was adopted because it allowed the results to be tested by weighing. Candles of the same make were used and hard sperm candles preferred as being less affected by variations of temperature than composite. The candles were allowed to burn during four hours. I give one result:—

In the dark (temp. 81° F.) each candle lost 544 grains, or 136 grains per hour.

In the light (temp. 84°) each candle lost 567 grains, or 142 grains per hour nearly.

It is evident that in this case the increase of temperature caused by the bright sunshine led to an increased consumption of material, but the general result was that light has no retarding influence on combustion. C. TOMLINSON

Highgate, August 25

Evolution by Leaps

WITH reference to an article entitled "Evolution by Leaps," in your "Biological Notes" (NATURE, vol. xvi. p. 208), I would call attention to a fact which is not unknown to horticulturists, that a hybrid sometimes proclaims its origin by producing—even on the same rachis—flowers and fruits, some of which resemble one parent and some the other.

Many a time I have plucked a branch of two or three feet in length from a pear-tree growing in a village in Kent, which bore at the proximal end pears of a certain size and description, and on the terminal twigs pears smaller in size, of a different flavour, and later in blooming and ripening.

As this "sport" prevailed throughout the tree, which was large and flourishing, there was no possibility of its being the result of a direct graft. PAUL HENRY STOKOE

Beddington Park

Zygœna Filipendulæ

IN July last I was breeding some *Zygœna filipendulæ* (six-spot Burnet moth) from pupæ taken in a chalk-pit near Cambridge, one of which was developed into a moth with five wings; four of these correspond to the normal wings in this species and are perfect in every respect, as also are five of the legs. The sixth leg (a hind leg) is absent, its place being filled up by the extra wing, which springs from the exact point at which the missing leg would naturally join the body. In appearance the extra wing resembles the ordinary hind wing of the species, but is only about half its usual size. It is of a yellowish-red tinge, and not so thickly covered with scales as the other wings of the insect. Of the sixth leg there is no external trace whatever, as far as I can see; in fact it would seem at first sight as if the leg had, by some means or other, been transformed into a wing.

This moth is subject to a good deal of variation as regards the size of the spots on the fore-wings, two of which are occasionally united; also, in this particular locality, the red colour is replaced by yellow in about 1 per cent. of the specimens. The chalk-pit to which I have alluded is scarcely an acre in extent, and as the species does not seem to occur elsewhere in the immediate neighbourhood, continuous interbreeding must have been going on for a long time.

I have never met with or heard of such a curiosity of morphology either in this or any other lepidopterous species before, but some of your readers will doubtless be able to adduce other instances of a similar nature. N. M. RICHARDSON

Clare College, Cambridge, August 21

Drosera

I BEG to enclose a photograph of a specimen of *Drosera rotundifolia* found by me at the Lickey Hills on July 1 this year.